

I claim:

1. A method of controlling the sound volume produced by an audio transducer, the method comprising the steps of:

generating a first signal that is in the audible frequency range;

generating a second signal where the second signal is a digital pulse train with a mark-space ratio of less than 100%, where the frequency of the second signal is higher than the frequency of the first signal;

modulating the amplitude of the first signal with the second pulse train signal to generate an output signal with similar timbre to that of the first signal;

applying the output signal to the audio transducer;

whereby the volume of sound produced by the audio transducer varies with the mark-space ratio of the second digital pulse train signal.

2. The method of claim 1, in which the first signal is a square wave which alternates between digital logic high and logic low levels.

3. The method of claim 1, in which the duty cycle of the second digital pulse train signal is approximately 50%.

4. The method of claim 1, in which the frequency of the second digital pulse train signal is above the range of human hearing.

5. The method of claim 1, in which the frequency of the second digital pulse train signal is greater than the cutoff frequency of the audio transducer.

6. The method of claim 1, in which the frequency of the second digital pulse train signal is approximately 64 kHz.

7. A method of generating a telephone ringing signal, the method comprising the steps of:

selecting a desired ring volume level;

generating a full volume telephone ringing signal;

multiplying the full volume ringing signal by a pulse train signal with mark-space ratio less than 100% to generate an output signal, where the mark-space ratio of the pulse train signal is dependent upon the selected desired ring volume level;

applying the output signal to an audio transducer;

whereby the audio transducer produces a reduced volume ring sound with similar timbre to that of the full volume telephone ringing signal.

8. A telephone set that can produce a ringing signal of varying volume upon receipt of an incoming telephone call to indicate that an incoming call is being received, which telephone is comprised of:

a user interface, which user interface permits the user to specify a desired ringing signal volume level;

a tone generator which generates a telephone ring signal;

a digital pulse train generator which receives the volume level specified by the user and generates a pulse width modulated pulse train signal with a mark-space ratio that is determined by the specified volume level;

a switch controlled by the output of the digital pulse train generator, such that the switch output receives the tone generator output when the pulse train generator outputs a mark and such that the switch output receives a logic low level when the pulse train generator outputs a space;

an audio transducer connected to the switch output for presenting an audible ringing signal to the user, whereby the volume of the audio transducer output varies depending upon the volume level selected using the user interface.

9. The telephone of claim 8, in which the telephone ring signal is a digital signal alternating between logic high and logic low levels.
10. The method of claim 8, in which the frequency of the digital pulse train signal is above the range of human hearing.
11. The method of claim 8, in which the frequency of the digital pulse train signal is greater than the cutoff frequency of the audio transducer.
12. The method of claim 8, in which the frequency of the digital pulse train signal is approximately 64 kHz.

13. A telephone set that can produce a ringing signal of varying volume upon receipt of an incoming telephone call to indicate that an incoming call is being received, which telephone is comprised of:

a user interface, which user interface permits the user to specify a desired ringing signal volume level;

a tone generator which generates a telephone ring signal comprised of a digital square wave;

a digital pulse train generator which receives the volume level specified by the user and generates a pulse width modulated pulse train signal with a mark-space ratio that is determined by the specified volume level;

a multiplier to which the telephone ring signal and digital pulse train signal are applied;

an audio transducer connected to the multiplier output for presenting an audible ringing signal to the user, whereby the volume of the audio transducer output varies depending upon the volume level selected using the user interface.

14. The telephone of claim 13, in which the frequency of the digital pulse train signal is above the range of human hearing.

15. The telephone of claim 13, in which the frequency of the digital pulse train signal is greater than the cutoff frequency of the audio transducer.

16. The telephone of claim 13, in which the frequency of the digital pulse train signal is approximately 64 kHz.

17. The telephone of claim 13, where the multiplier is a digital logic AND gate that receives the ring signal and pulse train signal as inputs.

18. A audible alert circuit which is comprised of:

a square wave tone generator;

a digital pulse train generator outputting a pulse width modulated pulse train signal with a mark-space ratio less than 100%;

a multiplier to which the outputs of the square wave tone generator and digital pulse train generator are applied;

an audio transducer connected to the multiplier output;

whereby an audible alert signal is generated having a volume level determined by the mark-space ratio of the pulse train signal.

19. The audible alert circuit of claim 18, in which the frequency of the pulse train signal is above the range of human hearing.

20. The audible alert circuit of claim 18, in which the frequency of the pulse train signal is greater than the cutoff frequency of the audio transducer.

21. The audible alert circuit of claim 18, in which the frequency of the pulse train signal is approximately 64 kHz.

22. The audible alert circuit of claim 18, where the multiplier is a digital logic AND gate that receives the outputs of the square wave tone generator and digital pulse train generator as inputs.

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